Terms of Reference

Naval Research Advisory Committee Modern Lighter Than Air Applications Assessment

Objective

To consider each of the forms of Lighter Than Air (LTA) Technology that are or could be available to fleet units within a decade and perform an assessment of their potential value for the full spectrum of Sea Power 21 missions from an affordability and utility perspective identifying opportunities to reduce the reliance upon existing Heavier Than Air assets and provide capabilities to meet new Global War on Terror (GWOT) generated needs. Emphasize the applications for (1) global transoceanic and sea based delivery of heavy, oversized cargo into areas which lack reception infrastructure (ports, airports, or landing fields) at sea and on land, (2) security of naval port/harbor resources (3) force protection from cruise missiles, fast boats, shallow water submarines and mines at sea and in port. Include manned and unmanned systems and options for government procured and crewed versus leased equipment with full contractor support.

Background

Twenty-first century Naval Forces must be prepared to cope with a wide variety of threats ranging from port and base protection from terrorists attacks to the possibility of littoral warfare against emerging peer forces. The range of threat and security tasks require the need for persistent intelligence, surveillance, reconnaissance, and communication (ISR&C) needs. The current family of air systems can provide a presence for relatively short periods but are costly. The Navy must identify and evaluate through demonstrations a means to provide **affordable** persistent ISR&C. Extended airborne flight utilizing lifting gas is an ancient method that has been employed periodically for important naval missions. The confluence of modern communications, sensors, propulsion systems and new materials presents and opportunity for a broader and more cost-effective exploitation of LTA technology. Airships and aerostats are being used in at least 13 different countries for commercial, military, and homeland security applications. Airship and aerostat programs are funded and exist today in U.S. Army, U.S. Air Force, Navy, DARPA, USCG and U.S. Northern Command in stages from operational (in OEF/OIF/Southern U.S., Gulf of Mexico) to ATD/ACTD.

The Naval Air Systems Command Airship Advanced Programs Development Office categorizes forms of manned and unmanned LTA vehicles and their possible applications as follows:

Category 1

COTS Commercial Airships: 150,000-300,000 cu ft non-rigid envelope airships which are primarily used for commercial advertising. Such crafts may be (and have been) leased and equipped with sensors/comms for use in domestic

surveillance of high value assets or, when equipped with protective systems, may be employed in hostile environments as they were by the UK over N. Ireland to counter IRA terrorism.

Sea Power 21 Application: High Value Asset Protection.

Category 2 – Military Airships

1960s era USN airships which varied in size from 500,000 to 1.5M cu ft configured for long-range ocean patrol and with weapons for ASW or equipped with very large aperture radars (7'x 48') for air surveillance.

Sea Power 21 Application: Coastal patrol for USCG/DHS, ASW, Sea Shield.

Category 3 – Hybrid Airships

Ultra-large blimps shaped like a low speed airfoil to exploit the dual benefits of static and dynamic lift. The lift envelopes for such craft will vary from 1 million to 50 million cu ft and carry payloads up to 500 tons over trans-global ranges. The major advantage of this design is that it eliminates the operational burden of ground crews to assist in airship landing, arrestment and cargo loading/unloading. The hybrid utilizes a proven air cushion system for ground contact and therefore can land or takeoff from most surfaces to include lakes, rivers, the ocean or desert. The trans global cruise speeds can vary from 50 to 100 kts with ranges in excess of 5000 nmi.

Sea Power 21 Applications:

- Rapid delivery of heavy equipment and troops over strategic distances to advanced sea base or directly into foreign territory, thus countering enemy anti-access measures or hauling supplies into areas which lack air/sea ports in support of disaster relief. Future Sea Base Connector.
- TACAMO – extended loiter in support of submarine communications.
- Navy/Army Low Altitude Air Defense against CM (Sea Shield).
- Battle Force CISR (FORCE Net).

Category 4 – High Altitude/Near Space Platforms (pseudolytes) and Aerostats

Platforms included tethered aerostats, HAA and free flight balloons equipped with sensor/comms payload.

Sea Power 21 Application: Sea Shield

In general, the primary product of LTA is Affordable Persistence while the Hybrid Aircraft offers a "transformation" in the areas of trans-global lift.

Specific Tasking

Specifically, this NRAC study will:

- Identify opportunities for and obstacles to exploitation of LTA technology for naval missions (e.g. budget, culture, technology maturity, COTS, International technologies, Congress, etc.)
- Based on potential utility/effectiveness, identify and prioritize the missions where LTA systems (manned or unmanned) offer the greatest promise in near, mid and long term to address future capability gaps (Sea Power 21, GWOT other)
- Identify technology development risks for the most promising applications
- Assess the potential of the industrial base to provide air vehicles, vehicle control systems, data links, sensor systems and affordable manufacturing for the various types of airship and aerostat systems

- If possible, assess manpower requirements for operations and support of these LTA systems (manned and unmanned)
- If possible, recommend an acquisition strategy for the highest payoff LTA systems (consider teaming/leveraging with other Services, other government agencies, etc.)